



Numerical simulations of barchan dunes under rotating flow

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A 3D cellular automaton model is used to capture some essential behaviors of individual dunes under a variety of wind conditions. For example, after a reorientation of the wind of 20° , the horn which is oblique to the wind becomes longer and, as on a flat sand bed, surface undulations appear along the horn which is oriented in the direction of the wind. The amplitude of this oscillation is growing and, finally, it breaks the horn. This leads to the formation and the emission of smaller barchan dunes.

Such an ejection mechanism is a good candidate to explain corridors of barchan dunes with a constant size distribution over long distances. Hence, we have developed different numerical tools that allow to calculate the evolution of the frequency-size relationship as well as the grain flux perpendicularly to the flow during our computations. From these predictions of the model, we discuss the stability of a population of dunes under rotating wind conditions.